

**WHAT IS CLAIMED IS:**

1. A digital signal reproducing apparatus comprising:
    - 5 DC controlling means for controlling a DC level of a reproduced signal in response to a DC level control signal;
    - sampling means for sampling an output signal from the DC controlling means to generate a sampling-resultant signal;
    - filtering means for filtering the sampling-resultant signal into a filtering-resultant signal;
  - 10 binarizing means for converting one of (1) the sampling-resultant signal and (2) the filtering-resultant signal into a binary signal;
  - DC level control signal generating means for generating the DC level control signal in response to the binary signal, and for outputting the DC level control signal to the DC controlling means;
  - 15 code offset detecting means for detecting an offset in a modulation-resultant-code pattern in response to the binary signal, and for generating code pattern offset information in response to the detected offset in the modulation-resultant-code pattern;
  - 20 offset-responsive controlling means for implementing one of (1) changing a response characteristic of a loop formed by the DC controlling means, the sampling means, the binarizing means, and the DC level control signal generating means and (2) suspending the DC level control by the DC controlling means in response to the code pattern offset information;
  - 25 subtracting means for subtracting a DC offset signal from one

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of (1) the reproduced signal, (2) the sampling-resultant signal, and (3) the filtering-resultant signal to generate a subtraction-resultant signal; and

- DC offset extracting means for extracting low-frequency
- 5 components from one of (1) the sampling-resultant signal, (2) the filtering-resultant signal, and (3) the subtraction-resultant signal as the DC offset signal, the low-frequency components corresponding to zero-cross sampling points.
- 10 2. A digital signal reproducing apparatus comprising:  
sampling means for sampling a reproduced signal to generate a sampling-resultant signal;  
DC controlling means for controlling a DC level of the sampling-resultant signal in response to a DC level control signal;
- 15 filtering means for filtering an output signal from the DC controlling means into a filtering-resultant signal;  
binarizing means for converting one of (1) the output signal from the DC controlling means and (2) the filtering-resultant signal into a binary signal;
- 20 DC level control signal generating means for generating the DC level control signal in response to the binary signal, and for outputting the DC level control signal to the DC controlling means;  
code offset detecting means for detecting an offset in a modulation-resultant-code pattern in response to the binary signal,
- 25 and for generating code pattern offset information in response to the detected offset in the modulation-resultant-code pattern;

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- offset-responsive controlling means for implementing one of  
(1) changing a response characteristic of a loop formed by the DC  
controlling means, the binarizing means, and the DC level control  
signal generating means and (2) suspending the DC level control by  
5 the DC controlling means in response to the code pattern offset  
information;
- subtracting means for subtracting a DC offset signal from one  
of (1) the sampling-resultant signal and (2) the filtering-resultant  
signal to generate a subtraction-resultant signal; and
- 10 DC offset extracting means for extracting low-frequency  
components from one of (1) the sampling-resultant signal, (2) the  
filtering-resultant signal, and (3) the subtraction-resultant signal as  
the DC offset signal, the low-frequency components corresponding  
to zero-cross sampling points.
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3. A digital signal reproducing apparatus comprising:  
sampling means for sampling a reproduced signal to generate  
a sampling-resultant signal;  
filtering means for filtering the sampling-resultant signal into  
20 a filtering-resultant signal;
- DC controlling means for controlling a DC level of the  
sampling-resultant signal in response to a DC level control signal;  
binarizing means for converting one of (1) the sampling-  
resultant signal and (2) the filtering-resultant signal into a binary  
25 signal;
- DC level control signal generating means for generating the

- DC level control signal in response to the binary signal, and for outputting the DC level control signal to the DC controlling means;
- code offset detecting means for detecting an offset in a modulation-resultant-code pattern in response to the binary signal,
- 5 and for generating code pattern offset information in response to the detected offset in the modulation-resultant-code pattern;
- offset-responsive controlling means for controlling the DC controlling means in response to the code pattern offset information;
- 10 subtracting means for subtracting a DC offset signal from one of (1) the sampling-resultant signal and (2) the filtering-resultant signal to generate a subtraction-resultant signal; and
- DC offset extracting means for extracting low-frequency components from one of (1) the sampling-resultant signal, (2) the filtering-resultant signal, and (3) the subtraction-resultant signal as the DC offset signal, the low-frequency components corresponding to zero-cross sampling points.
4. A digital signal reproducing apparatus comprising:
- 20 DC controlling means for controlling a DC level of a reproduced signal in response to a DC level control signal;
- sampling means for sampling an output signal from the DC controlling means to generate a sampling-resultant signal;
- DPLL means for resampling the sampling-resultant signal to
- 25 generate a resampling-resultant signal having a channel bit rate;
- filtering means for filtering the resampling-resultant signal

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into a filtering-resultant signal;

binarizing means for converting one of (1) the resampling-resultant signal and (2) the filtering-resultant signal into a binary signal;

5 DC level control signal generating means for generating the DC level control signal in response to the binary signal, and for outputting the DC level control signal to the DC controlling means;

code offset detecting means for detecting an offset in a modulation-resultant-code pattern in response to the binary signal,  
10 and for generating code pattern offset information in response to the detected offset in the modulation-resultant-code pattern;

offset-responsive controlling means for implementing one of (1) changing a response characteristic of a loop formed by the DC controlling means, the sampling means, the binarizing means, and  
15 the DC level control signal generating means and (2) suspending the DC level control by the DC controlling means in response to the code pattern offset information;

subtracting means for subtracting a DC offset signal from one of (1) the sampling-resultant signal, (2) the resampling-resultant signal, and (3) the filtering-resultant signal to generate a subtraction-resultant signal; and  
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DC offset extracting means for extracting low-frequency components from one of (1) the resampling-resultant signal, (2) the filtering-resultant signal, and (3) the subtraction-resultant signal as  
25 the DC offset signal, the low-frequency components corresponding to zero-cross sampling points.

5. A digital signal reproducing apparatus comprising:  
binarizing means for controlling a slice level relative to a DC  
level of a reproduced signal in response to a slice level control  
5 signal to generate a controlling-resultant slice level, and for  
comparing the reproduced signal with the controlling-resultant  
slice level to convert the reproduced signal into a binary signal;  
slice level control signal generating means for generating the  
slice level control signal in response to the binary signal, and for  
10 outputting the slice level control signal to the binarizing means;  
code offset detecting means for detecting an offset in a  
modulation-resultant-code pattern in response to the binary signal,  
and for generating code pattern offset information in response to  
the detected offset in the modulation-resultant-code pattern; and  
15 offset-responsive controlling means for implementing one of  
(1) changing a response characteristic of a loop formed by the  
binarizing means and the slice level control signal generating means  
and (2) suspending the slice level control by the binarizing means in  
response to the code pattern offset information.
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6. A digital signal reproducing apparatus comprising:  
DC controlling means for controlling a DC level of a  
reproduced signal in response to a DC level control signal;  
sampling means for sampling an output signal from the DC  
25 controlling means to generate a sampling-resultant signal;  
filtering means for filtering the sampling-resultant signal into

a filtering-resultant signal;

binarizing means for converting one of (1) the sampling-resultant signal and (2) the filtering-resultant signal into a binary signal;

5 DC level control signal generating means for generating the DC level control signal in response to the binary signal, and for outputting the DC level control signal to the DC controlling means;

code offset detecting means for detecting an offset in a modulation-resultant-code pattern in response to the binary signal,  
10 and for generating code pattern offset information in response to the detected offset in the modulation-resultant-code pattern; and

15 offset-responsive controlling means for implementing one of (1) changing a response characteristic of a loop formed by the DC controlling means, the sampling means, the binarizing means, and the DC level control signal generating means and (2) suspending the DC level control by the DC controlling means in response to the code pattern offset information.

7. A digital signal reproducing apparatus comprising:

20 sampling means for sampling a reproduced signal to generate a sampling-resultant signal;

DC controlling means for controlling a DC level of the sampling-resultant signal in response to a DC level control signal;

25 filtering means for filtering an output signal from the DC controlling means into a filtering-resultant signal;

binarizing means for converting one of (1) the output signal

from the DC controlling means and (2) the filtering-resultant signal into a binary signal;

- DC level control signal generating means for generating the DC level control signal in response to the binary signal, and for  
5 outputting the DC level control signal to the DC controlling means;  
code offset detecting means for detecting an offset in a modulation-resultant-code pattern in response to the binary signal, and for generating code pattern offset information in response to the detected offset in the modulation-resultant-code pattern; and  
10 offset-responsive controlling means for implementing one of (1) changing a response characteristic of a loop formed by the DC controlling means, the binarizing means, and the DC level control signal generating means and (2) suspending the DC level control by the DC controlling means in response to the code pattern offset  
15 information.

8. A digital signal reproducing apparatus comprising:  
sampling means for sampling a reproduced signal to generate a sampling-resultant signal;

- 20 filtering means for filtering the sampling-resultant signal into a filtering-resultant signal;

DC controlling means for controlling a DC level of the sampling-resultant signal in response to a DC level control signal;  
binarizing means for converting one of (1) the sampling-  
25 resultant signal and (2) the filtering-resultant signal into a binary signal;

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- DC level control signal generating means for generating the DC level control signal in response to the binary signal, and for outputting the DC level control signal to the DC controlling means;
- code offset detecting means for detecting an offset in a
- 5 modulation-resultant-code pattern in response to the binary signal, and for generating code pattern offset information in response to the detected offset in the modulation-resultant-code pattern; and
- offset-responsive controlling means for controlling the DC controlling means in response to the code pattern offset
- 10 information.
9. A digital signal reproducing apparatus comprising:
- DC controlling means for controlling a DC level of a reproduced signal in response to a DC level control signal;
- 15 sampling means for sampling an output signal from the DC controlling means to generate a sampling-resultant signal;
- DPLL means for resampling the sampling-resultant signal to generate a resampling-resultant signal having a channel bit rate;
- filtering means for filtering the resampling-resultant signal
- 20 into a filtering-resultant signal;
- binarizing means for converting one of (1) the resampling-resultant signal and (2) the filtering-resultant signal into a binary signal;
- DC level control signal generating means for generating the
- 25 DC level control signal in response to the binary signal, and for outputting the DC level control signal to the DC controlling means;

code offset detecting means for detecting an offset in a modulation-resultant-code pattern in response to the binary signal, and for generating code pattern offset information in response to the detected offset in the modulation-resultant-code pattern; and

- 5           offset-responsive controlling means for implementing one of (1) changing a response characteristic of a loop formed by the DC controlling means, the sampling means, the binarizing means, and the DC level control signal generating means and (2) suspending the DC level control by the DC controlling means in response to the  
10          code pattern offset information.

10. A digital signal reproducing apparatus as recited in claim 5, wherein the code offset detecting means comprises:

- 15          offset extracting means for extracting one of (1) low-frequency components and (2) a modulation-resultant-code pattern offset from the binary signal;

              comparing means for comparing an output signal from the offset extracting means with a prescribed value to generate a comparison-resultant signal;

- 20          code pattern offset information generating means for generating the code pattern offset information in accordance with one of (1) the output signal from the offset extracting means and (2) the comparison-resultant signal;

- 25          non-cross detecting means for detecting that one of (1) the reproduced signal and (2) the sampling-resultant signal does not cross the slice level, and for generating non-cross information in

response to a result of said detecting;

randomness detecting means for detecting a randomness of the modulation-resultant-code pattern in response to the binary signal and the output signal from the offset extracting means, and

- 5 for generating randomness information representative of the detected randomness; and

resetting means for resetting the output signal from the offset extracting means in response to the non-cross information and the randomness information.

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11. A digital signal reproducing apparatus as recited in claim 10, wherein the non-cross detecting means comprises means for detecting whether or not a modulation-resultant-code pattern having at least a prescribed run length is contained in the binary

- 15 signal, and for generating the non-cross information in response to a result of said detecting.

12. A digital signal reproducing apparatus comprising:

- first means for controlling a DC level of a reproduced signal to  
20 generate a DC-level-controlled signal in response to a DC level control signal;

second means for generating a binary signal in response to the DC-level-controlled signal generated by the first means, the binary signal representing a stream of bits each being "0" or "1";

- 25 third means for generating the DC level control signal in response to the binary signal generated by the second means, and

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for feeding the DC level control signal to the first means; and  
fourth means for suppressing a variation in the DC level  
control signal which responds to a difference in number between  
bits of "0" and bits of "1" in the bit stream represented by the binary  
5 signal.

13. A digital signal reproducing apparatus comprising:  
first means for comparing a reproduced signal representative  
of binary information with a slice level to convert the reproduced  
10 signal into a binary signal representing a stream of bits each being  
"0" or "1";  
second means for generating the slice level in response to the  
binary signal generated by the first means, and for feeding the slice  
level to the first means; and  
15 third means for suppressing a variation in the slice level  
which responds to a difference in number between bits of "0" and  
bits of "1" in the bit stream represented by the binary signal.